

## TAILPIPE OF AUTOMOTIVE VEHICLE

### BACKGROUND OF THE INVENTION

#### 1. Field of The Invention

The present invention relates to tailpipe of automotive vehicle and more particularly to such a tailpipe of automotive vehicle with improved characteristics.

#### 2. Description of Related Art

A conventional exhaust pipe of an internal combustion engine comprises an expansion chamber, a resonant chamber at the rear of the expansion chamber, and a plurality of perforated pipes disposed in both chambers, each pipe being enclosed by glass fibers or sound-absorbing material for silencing noise. Exhaust from the engine may flow into the chambers through apertures of the pipes. This can build a back pressure in the chambers, resulting in a partial back flow of exhaust into the engine. As an end, output torque of the engine is lowered due to incomplete combustion of the engine. U.S. Pat. No. 4,792,014 discloses an excessively long tailpipe of internal combustion engine such that it cannot be readily mounted at the exhaust pipe. Instead, a modification of the existing exhaust pipe is required. This is not advantageous. Further, noise is serious when a car incorporated such tailpipe is driving at high speed, especially more than 100km per hour. Hence, a need for improvement exists.

### SUMMARY OF THE INVENTION

It is an object of the present invention to provide a tailpipe of automotive vehicle. The tailpipe has a reduced length so as to be readily mounted at an exhaust pipe. The tailpipe comprises an outer tube constructed by incorporating the principles of venturi tube. By utilizing the present invention, it is possible of carrying out a more complete combustion, reducing air pollution, and further silencing noise.

To achieve the above and other objects, the present invention provides a tailpipe of an automotive vehicle, comprising a front tube including two flared ends and an intermediate neck having a plurality of rows of apertures wherein one flared end of the front tube is coupled to a muffler; a rear tube having a flared end; an outer tube surrounded a rear portion of the front tube and the whole rear tube, the outer tube including a flared front end, a cylindrical section, an enlarged section, and a rear section having an inward extending rim at an opening thereof; and a plurality of twisted blades equally spaced apart around the rear tube and connected to the front, the rear, and the outer tubes, each blade having a plurality of apertures, wherein a stream of exhaust from the muffler entering into the neck is divided into a first component flowing through the rear tube, and a second component flowing into a space between the neck and the outer tube through the apertures; the second component is mixed with air drawn from the front end of the outer tube to form a third component, the third component flows to a rear of the outer tube after being baffled by the blades and passing a plurality of channels each between two adjacent blades to form a fourth component in a form of whirlwind, and a fifth component in a form of whirlwind is formed by mixing the fourth component with the first component after leaving the tailpipe.

In one aspect of the present invention the outer tube has a length of about 12 cm, the front tube has a length of about 12.5 cm, and the tailpipe has a length of about 20 cm.

In another aspect of the present invention there is further provided a member formed of sound-absorbing material on a cylindrical surface of the outer tube.

The above and other objects, features and advantages of the present invention will become apparent from the following detailed description taken

with the accompanying drawings.

## BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a sectional view of a preferred embodiment of tailpipe of automotive vehicle according to the invention;

5        FIG. 2 is a front view of the tailpipe;

FIG. 3 is a rear view of the tailpipe;

FIG. 4 is a perspective view of the tailpipe; and

FIG. 5 is a view similar to FIG. 1 for illustrating a stream of exhaust through the tailpipe.

## 10       DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to FIGS. 1 to 4, there is shown a tailpipe of an automotive vehicle constructed in accordance with the invention. The tailpipe comprises a front tube 1, an outer tube 2, a rear tube 3, and a plurality of twisted blades 4. Each component will be described in detail below.

15       The front tube 1 comprises a front section 10, a coupling 11 at the front section 10, the coupling 11 having a plurality of lengthwise slits 111 and a ring fastener 112 enclosed the coupling 11 for flexibly compressing the coupling 11 and fastening one end of a muffler S at the coupling 11, a flared rear section 13, and a neck 12 interconnected the front section 10 and the rear section 13, the  
20       neck 12 having a plurality of rows of apertures 14 on its surface.

The rear tube 3 comprises a front section 32 coupled to the rear section 13, an intermediate section 31 having a diameter slightly smaller than that of the front tube 1, and a flared rear section 33.

A rear portion of the front tube 1 and the whole rear tube 3 are surrounded  
25       by the outer tube 2. The outer tube 2 is constructed by incorporating the principles of venturi tube. The outer tube 2 comprises a flared front section 21, a cylindrical section 20, an enlarged section 22, a rear section 24, and an inward

extending rim 23 at the opening of the rear section 24.

The blades 4 are equally spaced apart around the intermediate section 31 and are extended therefrom to fixedly couple to an inner surface of the enlarged section 22. The blade 4 comprises a front section 41 fixedly connected to the rear section 13, a plurality of apertures 42, and a rear section 43 coupled to rear portions of the outer tube 2 and the rear tube 3.

Referring to FIG. 5, stream of exhaust from an operating internal combustion engine to the tailpipe via an exhaust pipe will be described in detailed below. Stream of exhaust E enters into the neck 12 after leaving the muffler S. At the neck 12, pressure of the stream of exhaust E decreases in which a portion (i.e., stream component E1) of the stream of exhaust E flows into a space between the neck 12 and the cylindrical section 20 through the apertures 14. Stream component E1 is then mixed with air A drawn from the front section 21. Also, pressure of the stream component E1 decreases. Another portion (i.e., stream component E2) of the stream of exhaust E flows out of the rear section 13 into a space between the intermediate section 31 and the enlarged section 22 to be baffled by the blades 4. After leaving the blades 4 by passing a plurality of channels each between two adjacent blades 4 and the apertures 42, a whirlwind is formed. Still another portion (i.e., stream component E3) of the stream of exhaust E flows into the rear tube 3. Also, pressure of stream component E3 decreases in the rear tube 3. Thus, a stream component E4 is formed after leaving the rear section 33. A whirlwind type of stream component E5 is formed by the mixture of stream component E4 and stream component E2. As an end, exhaust E0 is carried away by stream component E5. Note that the provision of apertures 14 and 42 can reduce both temperature and pressure of exhaust.

Preferably, the outer tube 2 has a length of about 12 cm, the front tube 1

has a length of about 12.5 cm, and the tailpipe has a length of about 20 cm less than prior art. Hence, the tailpipe can be readily mounted at the rear of muffler S of an automotive vehicle at the coupling 11. Moreover, a sound-absorbing material can be formed around the outer tube 2 for further silencing noise.

5        It will be evident from the foregoing that the invention has the following advantages: High pressure exhaust from the muffler can be effectively driven out of the tailpipe by inducting air into the tailpipe to mix with stream of exhaust. As such, a more complete combustion of the engine is made possible. Further, pollutant contained in the exhaust can be effectively diluted by the induction or  
10    air. Hence, exhaust leaving the tailpipe is found to comply with even the strictest emission standard. Pressure of exhaust leaving the tailpipe is sufficiently lowered by the provision of a number of continuous enlarged and constricted stages of the tailpipe by incorporating the principles of venturi tube. This further facilitates the emission of exhaust.

15        While the invention herein disclosed has been described by means of specific embodiments, numerous modifications and variations could be made thereto by those skilled in the art without departing from the scope and spirit of the invention set forth in the claims.